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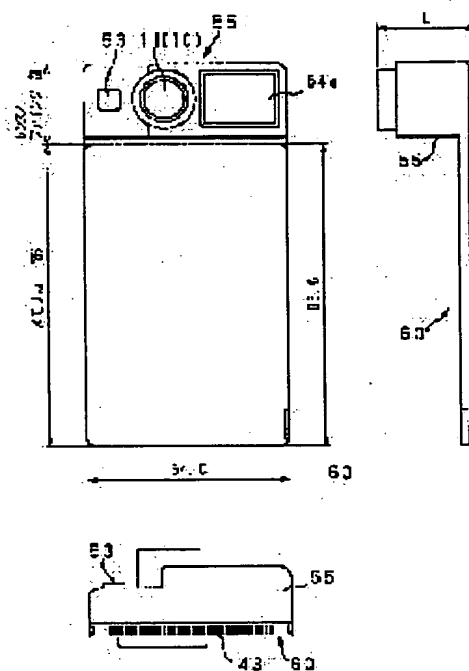
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(54) DIGITAL ELECTRONIC STILL CAMERA

(57)Abstract:

PURPOSE: To perform miniaturization, to reduce weight, to lower a cost and to simplify handling by integrating the various kinds of main electrical parts such as a digital video signal formation means and a compression means, etc., along with an image pickup means and an optical system for a slot mounting part.

CONSTITUTION: This camera can be divided into a memory card member 60 and a lens/finder part 55. The shape of the Type I of a PCMCIA standard is preserved as it is for the card part 60 and the lens/finder part 55 is constituted of a lens assembly part 10 provided with a lens 11 and a diaphragm, a finder part 54, a CCD image pickup element provided in the rear stage of the assembly part 10, a power source, an operation part such as a release button 53 or the like and an information display part for displaying photographable number-of-sheet display or the like. Then, since the card part 60 and the lens/finder part 55 are turned to an integrated shape, the entire size becomes close to the size of an IC memory card.



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CLAIMS

[Claim(s)]

[Claim 1] An image pick-up means to have the slot applied part of the appearance with which the slot for IC memory cards of the predetermined specification of a host device can be equipped, and to change into an image pick-up signal at least the light figure by which image formation was carried out on the image pick-up side, The digital video-signal means forming which forms a digital video signal from the optical system which carries out image formation of the above-mentioned light figure, and the above-mentioned image pick-up signal on the image pick-up side of the above-mentioned image pick-up means, The digital electronic "still" camera characterized by coming to arrange a compression means to perform data compression processing to the above-mentioned digital video signal, the interface means corresponding to the above-mentioned predetermined specification, and a data-logging means to the above-mentioned slot applied part.

[Claim 2] The digital electronic "still" camera according to claim 1 characterized by using a flash EEPROM as a data-logging means.

[Claim 3] The digital electronic "still" camera according to claim 1 characterized by mounting all the main electric equipment articles on one substrate.

[Claim 4] The digital electronic "still" camera according to claim 1 characterized by arranging the optical axis of the above-mentioned optical system in parallel [the above-mentioned slot applied part] with one side.

[Claim 5] The digital electronic "still" camera according to claim 1 characterized by preparing pipper as a finder.

[Claim 6] The digital electronic "still" camera according to claim 1 characterized by bending the above-mentioned optical system 90 degrees, and arranging it by using a mirror or prism.

[Claim 7] The digital electronic "still" camera according to claim 1 characterized by coming to prepare a compressibility modification means to change the compressibility of the data compression processing in the above-mentioned compression means.

[Claim 8] The digital electronic "still" camera according to claim 1 characterized by establishing a compressibility modification means to change the compressibility of the data compression processing in the above-mentioned compression means, and carrying out adjustable [of the compressibility] automatically according to the remaining recording capacity of a data-logging means.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention digitizes the photoed static image, memorizes it to storages, such as memory, and relates to the digital electronic "still" camera which can transmit the digital data to a computer etc.

[0002]

[Description of the Prior Art] In recent years, the IC card (IC memory card) which contained SRAM (Static Random Access Memory) and a flash plate memory device is developed as an archive medium of digital data, and the standardization is also progressing. Although characterized by that this IC card is a small light weight as semiconductor memory equipment, excelling in shock resistance, etc., that low-pricing is still more remarkable and various kinds of application is proposed recently.

[0003] as for the IC card which carried especially the flash EEPROM (Electrically Erasable Programmable Read Only Memory, the so-called flash memory), large-capacity-izing of a memory device and low-pricing are progressing — in addition, since the power source for storage maintenance has the advantage of needlessness, it is observed.

[0004] On the other hand, although the thing of some classes different physically and functionally has been proposed by IC cards until now, in Japan and the U.S., efforts for the standardization will be made in the 1980s from the last stage, a unification format is proposed according to application and current is accepted in the related industry. That is, it sets to Japan and is PCMICA (Personal Computer Memory Card International Association) in JEIDA (Japan Electronic Industry Development Association) and the U.S. Since the lead is taken, a standardization is attained and the adjustment between these Japan-U.S. engines (JEIDA and PCMCIA) is also attained completely, this standardization proposal is becoming world specification.

[0005] Moreover, a development announcement of some digital electronic "still" cameras (DSC) is made by the hand of the company in current, Japan, and the U.S., or it was produced commercially and has appeared on the market in the commercial scene. The greatest application of this camera is digitizing an image and sending that digital data to a computer. The transmitted image data concerned is processed in the environment of a computer, or is put and transmitted to a digital communication network.

[0006] For example, as shown in drawing 18, the digital printer, printing/platemaking system, etc. are contained in the still picture system which makes the digital electronic "still" camera 500 a picture input device a core [a computer (for example, personal computer 501)] as an output unit 502, and various kinds of configuration gestalten can be taken now according to an application. The image photoed with the camera 500 is specifically printed as it is with the digital printer as an example of an output unit 502, it can consider as instant photography, or it can apply to printing/platemaking equipment, and the advertisement advertisement of goods etc. can be printed. Moreover, it is useful also to inserting a photograph into [various] a document and creating an effective document. Once image data is incorporated by the computer 501, it is processed, and in any case, it is outputted if needed. Moreover, these image data in computing

environment is saved at the external storage 503, such as an MO disk (magneto-optic disk) and large capacity HD (hard disk), if needed.

[0007] The still picture system which makes such digital electronic "still" cameras an image input means is excellent in simple nature as the advantage compared with the system which makes the conventional silver salt film camera an image input means, and it is mentioned that it is advantageous to environmental preservation.

[0008] Namely, although the image by the conventional silver salt film camera needs equipments, such as a scanner, to digital-data-ize a film image in addition to being inferior by the sex instancy, a digital electronic "still" camera can be carried out by itself in an instant, can digitize an image, and can transmit it to a computer. Moreover, in order to generate the image by the silver salt film camera like common knowledge, a lot of chemicals and water are required, and it is disadvantageous in the viewpoint of environmental preservation. On the other hand, in the digital electronic "still" camera, the point that such processings are unnecessary and there is no generating of waste fluid has been the advantage.

[0009] On the other hand, in respect of image quality, current is excellent in the direction of the image of a silver salt film camera. This cause is because the dynamic range of a system included mainly to the resolution engine performance and image-processing circuit of the CCD (Charge Coupled Device) image sensor which the digital electronic "still" camera carries is less than a silver halide film. however, the engine performance of the various devices carried in a digital electronic "still" camera is markedly alike, and is improving recently, and the digital electronic "still" camera which realized image quality for which a silver salt film camera is pressed is also put on the market. The image quality of a digital electronic "still" camera continues to be predicted to be what improves certainly objective.

[0010]

[Problem(s) to be Solved by the Invention] By the way, the data size of the image data which the digital electronic "still" camera which incorporates natural drawings, such as a person, scenery, or goods, generates is document binary data and CG (Computer Graphics). Generally compared with data and voice data, it is huge.

[0011] The subject-copy image data of the digital electronic "still" camera by which current commercialization is carried out are as large as 0.5MB (megabyte) - about 10MB in front of a pressing operation. The image data with such large sizes occupies a memory area so much, and also data transfer takes immense time amount to it. The real use top compressed subject-copy image data from several [1/] to 1/dozens using the compression algorithm by the so-called JPEG (Joint Photographic Experts Group) etc. inside the camera concerned, and it records on recording devices, such as an IC card, or it has transmitted them to the computer.

[0012] But as usual, image data size is not small, therefore the capacity of a recording device poses a problem especially on real use of the digital electronic "still" camera concerned. That is, since the mass recording device is expensive to a large-sized top, an IC card with small, cheap, and sufficient capacity for the camera application concerned is called for.

[0013] Generally, the semiconductor memory built in an IC card is still comparatively high-priced as compared with a hard disk. Although a hard disk will be about 300 yen per MB (¥300-/MB) as of 1994 if both are compared by what price it becomes per unit capacity, semiconductor memory is 10 times [5 to] the price of this. However, the price fall of semiconductor memory in recent years is remarkable in especially a flash memory. The unit price per unit capacity of a flash memory is predicted to be that which falls below to the present hard disk within the past three - four years. Moreover, the degree of integration of the flash plate memory device itself is also improving by leaps and bounds, and there are possibilities in the IC card as a digital electronic "still" camera application very much.

[0014] Now, when the transfer approach to the computer of an image data recorder and its data is observed, there are two classes of these electronic "still" cameras greatly. That is, as an image data recorder, one of them adopts IC memory card and a comparatively small hard disk drive (HDD), and this image data recorder is removable (removable). For example, as shown in drawing 19, the IC memory card (or hard disk drive unit) 504 as an image data recorder can remove from camera 500 body easily, and can equip the digital device by which a computer 501

and others correspond. By this approach, a computer 501 can be crowded direct picking in image data.

[0015] Another side has the memory section of dedication in the interior of a digital electronic "still" camera as an image data recorder, and its it is not removable. For example, in order to transmit image data to the digital device by which a computer 501 and others correspond at drawing 20 so that it may be shown, the cable path 505 is required, for example, they are RS-232C and SCSI (Small Computer System Interface). It transmits based on the said protocol.

[0016] Such conventional digital electronic "still" cameras were gestalten with comparatively big all, although it is a stock camera. That is, also although it was called the electronic "still" camera most formed into small lightweight at present, as compared with the compact camera of the silver halide film method in a commercial scene, it had one 2 to 3 times the volume of this, and weight was also heavy in proportion to it. In this gestalt and weight, even if it can put, for example into a bag, it is hard to say that it is difficult to put in and carry, for example to the chest pocket of a shirt, and it is the product which employed the small lightweight nature of a special IC card efficiently.

[0017] Moreover, with the type camera with the above-mentioned removable image data recorder, it had the fault of the action of once taking out an IC card and a hard disk unit from a camera in order to carry out a digital interface to a computer having been required, and components excessive in order to make it removable it to not only to become time and effort, but having been required, and becoming cost quantity.

[0018] Furthermore, with the camera of the type which transmits data through the above-mentioned cable path, the cable was required for connection with a computer, and there was a fault actuation not only takes time and effort, but that cost started the cable interface section too, and since time amount was the need, signal processing and transmission of a cable interface had the fault of require a long time at a transfer, as compared with the type camera with the above-mentioned removable image data recorder.

[0019] It is mentioned as a general tendency of the conventional digital electronic "still" camera further again that the price is high.

[0020] Although these cameras are based also on the engine performance, in the U.S. commercial scene, current sale of them is carried out for 120,000 yen - 1,500,000 yen in realized price \$700-\$10000 and a Japanese commercial scene. Moreover, when regarding the digital electronic "still" camera concerned as a peripheral device of a computer system, it is said that 10 - 30% of the body of a computer is appropriate to the price of the camera concerned, and it is level on which this is accepted in a user. In the viewpoint, it must be said that most present digital electronic "still" cameras are yet very expensive in current [which is falling till the place where a personal computer (so-called personal computer) price is below 200,000 yen].

Furthermore, the compact camera of a silver halide film method does not reach for saying, but it is greatly different from the price band of the disposable camera (the so-called "disposable camera") with which quantity huge in recent years is sold widely, and it is impossible for me to purchase a digital electronic "still" camera to a general public welfare user freely, and to have him use it as a matter of fact.

[0021] This invention is proposed in view of the above actual condition, and aims at offer of small [which employed the description of an IC card efficiently] / lightweight / cheap and simple digital electronic "still" camera of handling.

[0022]

[Means for Solving the Problem] This invention is proposed in order to attain the purpose mentioned above, and it has the slot applied part of the appearance with which the slot for IC memory cards of the predetermined specification of a host device can be equipped. An image pick-up means to change into an image pick-up signal at least the light figure by which image formation was carried out on the image pick-up side, The digital video-signal means forming which forms a digital video signal from the optical system which carries out image formation of the above-mentioned light figure, and the above-mentioned image pick-up signal on the image pick-up side of the above-mentioned image pick-up means, It is characterized by coming to arrange a compression means to perform data compression processing to the above-mentioned

digital video signal, the interface means corresponding to the above-mentioned predetermined specification, and a data-logging means to the above-mentioned slot applied part.

[0023] Here, the digital electronic "still" camera of this invention can mount all these main electric equipment articles on one substrate, and a flash EEPROM can be used for it as a data-logging means. Moreover, it is arranged, or the above-mentioned optical system is using a mirror or prism, and the above-mentioned optical system itself is bent 90 degrees, and it is arranged so that the optical axis may become parallel [the above-mentioned slot applied part] to one side. Furthermore, he is also trying to use pipper for the digital electronic "still" camera of this invention as a finder application. Moreover, the digital electronic "still" camera of this invention comes to prepare a compressibility modification means to change the compressibility of the data compression processing in the above-mentioned compression means, and adjustable [of the modification of this compressibility] is automatically carried out according to the remaining recording capacity of a data-logging means besides modification by the user.

[0024]

[Function] Since various main electric equipment articles, such as digital video-signal means forming and a compression means, are unified and constituted with an image pick-up means and optical system to the slot applied part of the appearance with which the slot for IC memory cards of the predetermined specification of a host device can be equipped according to this invention, the magnitude as the whole will become as near as the magnitude of IC memory card.

[0025] moreover, according to this invention, optical system is arranged or thickness is made thin by bending ***** (ing) the optical system itself 90 degrees with a mirror or prism so that an optical axis may become parallel [the slot applied part of the appearance according to IC memory card] to one side.

[0026] Furthermore, according to this invention, the components mark for finders are reduced by using pipper as a finder application.

[0027] Furthermore, according to this invention, modification of the compressibility of data compression processing is enabled and a setup of the number of sheets of the photography image recorded on a data-logging means to arbitration is enabled.

[0028]

[Example] Hereafter, with reference to a drawing, the example of this invention is explained in full detail.

[0029] The digital electronic "still" camera of this invention example comes to have the memory card section 60 which is a slot applied part of the appearance with which the slot for IC memory cards of the predetermined specification of the host device 59 (slot for IC memory cards of PCMCIA specification mentioned later) can be equipped, as shown in drawing 1. CCD image sensor 20 which is an image pick-up means to change into an image pick-up signal at least the light figure by which image formation was carried out on the image pick-up side to this memory card section 60, The lens assembly 10 as optical system which carries out image formation of the above-mentioned light figure on the image pick-up side of above-mentioned CCD image sensor 20, The configuration from the analog video-signal processing circuit 31 as digital video-signal means forming which forms a digital video signal from the above-mentioned image pick-up signal to the interpolation process DSP 33, The compression circuit 36 as a compression means to perform data compression processing to the above-mentioned digital video signal, The card interface circuitry 37 as an interface means corresponding to the above-mentioned predetermined specification and 68 pin connectors 43, and the flash plate memory device 38 as a data-logging means are arranged.

[0030] Here, before starting concrete explanation of the digital electronic "still" camera of this invention example, the outline of IC memory card by said PCMCIA describes the spec. relevant to this invention. After this, unless it refuses especially, IC memory card which built in the flash plate memory device is only called a memory card below. And the memory card in this example shall be based on said JEIDA/PCMCIA specification. Moreover, JEIDA/PCMCIA specification will only be collectively called "PCMCIA specification" by the following explanation.

[0031] The memory card of the above-mentioned PCMCIA specification has the projected area of abbreviation credit card size, as shown in drawing 2 - drawing 4, and as for card thickness,

three kinds are specified. In addition, the gestalt of three kinds of memory cards of for example, PCMCIA specification used for drawing 2 - drawing 4 as a card 504 of drawing 19 mentioned above is shown. Moreover, in each drawing of drawing 2 - drawing 4, a right side view is shown in (b) and the front view is shown for the card top view in (c) at (a). Any [these] card of a superficial configuration is the same, although the connection with a host device is unified by the connector 511 of 68 pins of dedication, the thickness of the card concerned differs, and it is Type to order from the one where thickness is thinner, respectively. It is called I (Type 1), Type II (Type 2), and Type III (Type 3).

[0032] The configuration of a slot (insertion opening with which a memory card is inserted) 520,530,540 where the host device side (computer 501 of said drawing 19) by which it is equipped with the card 504 of each type of such drawing 2 - drawing 4 corresponds is shown in drawing 5 R> 5 - drawing 7.

[0033] It is Type as shown in these drawing 2 - drawing 7. The rail configuration in which each memory card 540 of I-Type III is inserted in the guide slot by the side of the connection connector 521 (namely, 68 pin configuration and a signal sequence) and slot 520,530,540 is communalized. Therefore, also in the configuration by the side of the slot 520,530,540 of drawing 5 - drawing 7, the dimensions of the direction of a short hand of a hole only differ. this — Type if it is the memory card of I — Type II or the slot 530,540 for Type III — moreover, Type II If it is a memory card, it is shown that it can be used also for the slot 540 for Type III, inserting.

[0034] It returns to drawing 1 and the digital electronic "still" camera of this invention example is described concretely.

[0035] The memory card which built in the flash memory which records image data and which was mentioned above is made to unify, and the digital electronic "still" camera of this example can insert the electrical part of the lens assembly 10, CCD image sensor 20, and others, and the functional part as a camera in the slot for memory cards of the host device 59 the whole camera of this example at it.

[0036] CCD image sensor 20 carried in the digital electronic "still" camera of this example corresponds to the diameter flux of light system of 1/4 inch, optical size is 4.76mmx3.57mm and package size is 9mm angle. Moreover, a pixel configuration is a perfect square, and after it carries out digital conversion of the image pick-up signal, it serves as a specification which becomes easy to deal with it on a computer. The numbers of effective pixels are 640 horizontals, 480 perpendiculars, and about 300,000 pixels of grand totals. Furthermore, since the drive method called the so-called "all pixel read-out methods" is used for this CCD image sensor 20 and a perpendicular direction scan can be performed by non-interlaced one at the time of read-out, electronic shutter control of a frame image is possible. When photoing a still picture, this means that a frame still picture can be photoed, even if a mechanical shutter like before is not used for it to the photographic subject which has a motion especially. Therefore, to the digital electronic "still" camera of this example, the mechanical shutter is unnecessary.

[0037] Now, after it carries out image formation of the light from the photographic subject which carried out incidence through each lenses 11 and 13 and diaphragm (iris) 12 grade in the lens assembly 10 on above-mentioned CCD image sensor 20 and photo electric conversion is carried out here, it is read by non-interlaced one in order of a pixel array, and is inputted into the analog system image pick-up digital disposal circuit 31. In this digital disposal circuit 31, predetermined analog processings, such as sample hold and gain control, are performed to an image pick-up signal from above-mentioned CCD image sensor 20. The video signal which received processing by the digital disposal circuit 31 concerned is digital-signal-ized by the analog / digital conversion circuit 32. After this, it becomes the digital processing field of a signal.

[0038] Subsequently this digital video signal receives luminance-signal processing and chrominance-signal processing of color interpolation, gamma control, the White clip, etc. in the interpolation process (Digital Signal Processor) DSP 33. The interpolation process DSP 33 concerned has the function which carries out DITEKUTO (detection) of the above-mentioned video signal, and outputs a detecting signal required for AE (Auto Exposure Control: automatic exposure control) of the digital electronic "still" camera concerned, AF (Auto Focusing Control: automatic-focusing control), or AWB (Auto White Balance Control: automatic color temperature

control) to CPU41 for system controls (Centrl Processing Unit) again.

[0039] The video signal processed in the above-mentioned interpolation process DSP 33 is a brightness (Y) signal and the color difference (Cr/Cb). It separates into a signal, and goes into the frame memory controller (FMC:Frame Memory Controller) 34, and a frame memory (FM:Frame Memory) 35 memorizes by control of this controller 34. The frame memory 35 concerned is the memory for carrying out the maintenance storage of the signal through the above-mentioned controller 34 temporarily, for example, is DRAM (Dynamic Random Access Memory). It is constituted by the device etc.

[0040] Now, the signal memorized / held is divided into the dot data (for example, 16 dots of horizontal directions, 16 dots of perpendicular directions) of a predetermined daily dose, is read to a frame memory 35 one by one, and is once inputted into it in the compression circuit 36. The signal inputted into this compression circuit 36 receives the compression like data by the here predetermined ratio, and serves as small data size. As an algorithm of compression in the compression circuit 36 concerned, the so-called JPEG (JointPhotographic Experts Group) method is adopted, for example. Moreover, although a compressive ratio is determined as a design specification of a digital electronic "still" camera, the data size of the signal at the time of compressing into 1/16, for example is as follows.

[0041]

Subject-copy image : After 0.3072MB interpolation process DSP processing : After 0.4608MB1 / 16 compression : The signal processed 0.0288MB in this compression circuit 36 is sent to the flash plate memory device 38 through the card interface circuitry 37. The card interface circuitry 37 is controlled by CPU (CPU for flash memory control)39 which performs writing / read-out control of the data to the memory device 38 concerned. The input signal to the above-mentioned interface circuitry 37 is stored in the storage region of assignment in the above-mentioned memory device 38 according to control of CPU39 concerned. In addition, CPU39 is communicating also with CPU41 for system controls through an internal bus.

[0042] Here, when the memory space of the flash plate memory device 38 is assumed to be 2MB, photography number of sheets can be estimated as follows. The data size (0.0288MB) after the above-mentioned compression is the total data size including header information, when header information required since it stores in memory (file) is taken into consideration, since it is the amount of only a video signal purely. : Since it becomes one 0.0350MB / image and becomes 2/0.035**57 sheets, the image for 57 sheets is storable. The amounts of storage of a memory card called 57 in this case (photography number of sheets) are the need and sufficient thing in the anticipated use of a digital electronic "still" camera.

[0043] Then, the data of the image stored in the above-mentioned flash plate memory device 38 will be sent to the external host device 59 through further 68 pin connectors 43 through the card interface circuitry 37.

[0044] Furthermore, this example digital electronic "still" camera is equipped also with the small power source 50, the power control circuit 42 which comes to have a DC-DC converter etc., the CCD driver 40 and the control unit (DSC control unit) 42 of the cameras concerned, such as a release carbon button, and the information-display section (DSC information-display section) 52 that displays the information on the cameras concerned, such as number of sheets which can be photoed, a dc-battery indicator display, etc. which consist of a liquid crystal display (LCD:Liquid Crystal Display). CPU41 for system controls performs these control and processing of the information from these.

[0045] That is, CPU41 for system controls performs AF (automatic-focusing control) by performing AE (automatic exposure control) by controlling actuation of the drawing 12 of the lens assembly 10 using the detecting signal from said interpolation process DSP 33, and carrying out migration control of the lens (it being for example, lens 13 grade in the case of the so-called inner focus), and controls said actuation of said CCD image sensor 20 through the CCD driver 40 further. Moreover, CPU41 for system controls generates the signal for the liquid crystal display drive of the DSC information-display section 52, and performs control of each part etc. according to the actuation signal from the DSC control unit 51.

[0046] By the way, the digital electronic "still" camera of this example also has the big

description that photography number of sheets is made to adjustable, by adopting an image data compression technique. This function is impossible in the existing silver salt film camera. A digital electronic "still" camera can be dealt with to arbitration even as a recording device which also photographs photographing 30 memory cards of 2MB of memory space by changing compressibility, or 120 photographing 60 sheets. That is, in a digital electronic "still" camera, a user can realize "the camera which can be used without seldom caring about the amount of remainder of photography number of sheets" with compression technology. Although this compressibility adjustable actuation is because the carbon button for the compressibility selection in which a user is prepared on the DSC control unit 51 etc. is operated, it shall also be automatically changed by the camera concerned itself according to the available memory of other, for example, a flash plate, memory devices 38.

[0047] Next, the configuration specification of the 1st example of this example digital electronic "still" camera is explained using drawing 8 and drawing 9. In addition, a right side view is shown in (b), a front view is shown for the top view of this example camera in (a) of drawing 8 at (c), and the bottom view of this example camera is shown in drawing 9.

[0048] Although this example camera is roughly divided and it is divided into the memory card section 60, and the lens / finder section 55, the memory card section 60 is Type of PCMCIA specification like drawing 8 and drawing 9. The configuration of I is saved as it is and it has become the configuration with which the memory card section 60 concerned, and the lens / finder section 55 were united.

[0049] A lens / finder sections 55 are as follows among each component of drawing 1, and are constituted. That is, a lens / finder section 55 consists of the lens assembly section 10 which extracts as the lenses 11 and 13 of said drawing 1, and contains 12, the finder section 54 (as for the front face of a finder, and 54b, 54a shows a finder side), CCD image sensor 20 prepared in the latter part of the lens assembly section 10, said power source 50, a control unit 51 of release carbon button 53 grade, and the information-display section 56 that displays the number-of-sheets display which can be photoed.

[0050] Furthermore, the memory card section 60 is the thing of the range shown by the drawing middle point line of drawing 1 among each component of said drawing 1, and is constituted. That is, the memory card section 60 consists of the CCD driver 40, the analog system image pick-up digital disposal circuit 31, the analog / digital conversion circuit 32, the interpolation process DSP 33 and CPU41 for system controls, the power control circuit 42, the frame memory controller 34 and a frame memory 35, the compression circuit 36, the card interface circuitry 37, CPU37 for flash memory control, a flash plate memory device 38, and 68 pin connectors 43. Thus, each [these] component is mounted in high density by the memory card section 60.

[0051] Next, the mounting condition of each component on the printed circuit board (PCB:Printed Circuit Board) 71 prepared in the interior of the digital electronic "still" camera of the 1st example is shown in drawing 10. In addition, the front view of the circuit board is shown in (a) of drawing 10, and a right side view is shown in (b). Moreover, the part shown with the alternate long and short dash line in drawing of drawing 10 shows the appearance of the 1st example camera concerned.

[0052] That is, all the main components are mounted in the printed circuit board 71 of one sheet until the 1st example camera begins the lens assembly 10 and CCD image sensor 20 and results [from a power source 50] in the flash plate memory device 38. This means further that a harness (connection) and a connector are unnecessary entirely inside a camera as advantageous to small / lightweight-izing of a camera naturally. While the product cost of materials can be reduced by this, each electrical-and-electric-equipment-adjustment and inspection at the time of camera manufacture are simplified, and synthetic manufacturing cost reduction is possible.

[0053] As mentioned above, the digital electronic "still" camera of this example is very lightweight [small/lightweight] as compared with the conventional electronic "still" camera. Therefore, each actuation of photography etc. can be performed easily. Moreover, about carrying, it can put into a handbag or Poti satisfactory and can also put into the pocket of a shirt. In such still picture photography with which the simple nature at the time does not want to miss a shutter chance by carrying, it becomes an important function especially.

[0054] Moreover, since the digital electronic "still" camera of this example has AE (automatic exposure control), AF (automatic-focusing control), and an AWB (automatic color temperature control) function like the above-mentioned, photography actuation can be performed by being full automatic, and a photography person should just push the release carbon button 53 towards the photographic subject aimed at. Moreover, as for the digital electronic "still" camera of this example, photography number of sheets, a dc-battery indicator, etc. are displayed on the information-display section 52, and a photography person can know the residue of the number of sheets which can be photoed, and a dc-battery at any time.

[0055] That is, this invention example camera cannot be freely used like the so-called "disposable camera", and a user can carry around without being conscious of a digital electronic "still" camera, and can take a photograph freely.

[0056] In addition, although all of the analog / digital conversion circuit 32 after the analog system image pick-up digital disposal circuit 31, or each electronic circuitry of the interpolation processes DSP33 and CPU41 and 39 grades are expressed with above-mentioned explanation as a separate configuration, it is also possible to be referred to as LSI (large-scale integrated circuit) equipped with all these functions. Thus, by LSI-izing, the man day reduction at the times of a miniaturization or manufacture is still attained.

[0057] Now, in this example digital electronic "still" camera, when photography is completed, image data will be transmitted to the host device 59 through 68 pin connectors 43. At present, in almost all cases, the host device in this case is a computer, and is the so-called personal computer (for example, a desktop mold and a laptop type are pointed out) especially.

[0058] Since the specification gestalt of the memory card of PCMCIA specification is saved as it is as mentioned above, the digital electronic "still" camera of this example can be used for the slot of the computer for every camera, inserting. It inserts in SURROTTO of a computer or this means that the said actuation which takes out a memory card from an electronic "still" camera, and connects a computer with an electronic "still" camera by the cable like before is unnecessary entirely.

[0059] After connecting the electronic "still" camera of this example to a computer, a computer reads image data in the camera concerned (that is, image data is sucked up from the memory in an electronic "still" camera to the memory by the side of a computer). This actuation is performed in a computer side. At this time, CPU by the side of a computer accesses to CPU39 for memory control in the memory card section 60 of this example electronic "still" camera. PCMCIA which is the specification which has the versatility which specified the communication link algorithm of the interior/external storage (memory) the computer side CPU in PCMCIA specification here ATA (AT bus Attachable) is specified, and if it is the combination of a memory card and a computer corresponding to the algorithm of the ATA concerned, reading actuation is possible as it is. In the case of combination to which only the combination of the memory card and computer which do not support ATA specification, and one of the two support ATA specification on the other hand, the driver software for the reading [side / computer] actuation according to the interface specification of a memory card is required.

[0060] In addition, in order to develop the image data transmitted to the computer side on each application software in which it is installed by the computer concerned, it may be required to change the file format of image data according to application. Generally, although this conversion is performed by the software of dedication, file translation software is attached to the digital electronic "still" camera of this invention example, and a user will use each application, after installing this file translation software in a computer on hand.

[0061] Moreover, with the personal computer which is circulating in this time, the model which carries the slot for the memory cards of said PCMCIA specification stops at a fraction comparatively. The slot of a standard equipment is FDD (Floppy Disk Drive) 3.5 inches. A CD-ROM (Compact Disc-Read Only Memory) drive is common. However, hardware / software vendor has accomplished the majority and the main vendors (vendor) which have declared the support of the memory card of PCMCIA specification will be considered that each personal computer is equipped standardly with the memory card slot of PCMCIA specification in the near future from now on. Moreover, the memory card reader system corresponding to PCMCIA

specification used by a SCSI cable etc., connecting with each personal computer is sold for hardware/software, and the environment which can use PCMCIA specification memory card as external storage is ready also in the personal computer which current has not equipped with the slot for PCMCIA specification memory cards.

[0062] Next, other examples about this example digital electronic "still" camera are explained.

[0063] In old explanation, the number of CPUs which the digital electronic "still" camera of this example has equipped was two. That is, one side is CPU41 which manages the system control / image-processing control inside a camera, and another side is CPU39 which manages the communication link with flash memory control / host device. It is also possible to unify CPU of these plurality as the 2nd example, and to consider as the 1 chip CPU, and a miniaturization and the cost-of-materials reduction of it are thereby still attained so that it may be easily thought out from the function which both CPUs achieve, and the property which CPU originally has.

[0064] By the way, by said explanation, the memory card section 60 of this example camera is Type of PCMCIA specification. Although considered as the gestalt specification of I, this memory card part 60 is Type II of PCMCIA specification. Or it is clear that you may be the gestalt specification of Type III at old explanation.

[0065] Moreover, the dimension L in drawing 8, i.e., the maximum thickness of an electronic "still" camera, influences greatly small / lightweight-ization of the camera concerned. In order to make this dimension L as small as possible, the focal distance f of a lens must be made small. Moreover, a dimension L becomes large, therefore it is not so desirable in the gestalt of drawing 8 to give adjustable [adjustable / of the value of a focal distance f], i.e., a zoom function. In addition, as for the dimension L of above-mentioned drawing 8, this is also set to about 25mm although the value of the focal distance f of the lens of the digital electronic "still" camera of this invention example is considered as immobilization by 4mm.

[0066] It considers as the example which made this dimension L as small as possible, and like drawing 8 and drawing 9, the 3rd example is shown in drawing 11 and drawing 12, and the 4th example is shown in drawing 13 and drawing 14. It is possible to realize the lightweight[small/]-ized digital electronic "still" camera, without sacrificing simple nature of carrying of a camera which was mentioned above, even when carrying out like these 3rd and 4th examples, and a zoom function is given to not only when the value of the focal distance f of a lens is immobilization, but a lens and lens assembly die length increases further.

[0067] First, the description of the 3rd example shown in drawing 11 and drawing 12 makes thickness of a card thinner than a previous example by arranging the direction of a short hand and lens optical axis of a memory card in parallel. Moreover, when inserting the memory card section 160 in a slot, he is trying for a lens / finder section 155 not to become obstructive by this 3rd example. Namely, in case the memory card section 60 is inserted in a slot by the previous example As opposed to there being a possibility of becoming what it has the lens 11 and Finders 54a and 54b of a lens / finder section 55, and the information-display section 52 for by hand (it holds with a finger), and a fingerprint adhering to these lens 11 grade, or becoming dirty By the 3rd example concerned, in order that there may be no lens etc. in the location which becomes what it has by the hand of a lens / finder section 155 (it holds with a finger) (it has not exposed), the worries about the above-mentioned dirt etc. decrease.

[0068] Furthermore, by this 3rd example, a finder is simplified and it is considering as pipper 154. Pipper 154 is used at the time of collimation of for example, a rifle gun etc., and in this example, as shown in (b) of drawing 11, it is formed in the tip upper part of the lens 111 of a lens / finder section 155 by the round hole. This is contributing to small / lightweight-izing of an electronic "still" camera, and a cost cut greatly. Moreover, at this example, the memory card section 160 is Type II of PCMCIA specification. It is a configuration. Moreover, since it is arranged at the memory card section 160, it is formed in ****, and the information-display section 152 is Type II of PCMCIA specification. The maximum appearance is overflowed. By this 3rd example, a dimension L becomes regardless of the focal distance and zoom ratio of a lens, for example, to about 10-15mm, is made small and made so that clearly from drawing 11.

[0069] Next, the description of the 4th example shown in drawing 13 and drawing 14 is having stored a lens / finder section 255 into the volume of a memory card completely. Therefore, the

gestalt of Type III of PCMCIA specification is used for the memory card section 260. Optical-axis arrangement of a lens 211 and a finder 254 is parallel to the direction of a short hand of a memory card like the 3rd example. Moreover, the information-display section 252 is formed in ****. As shown in (b) of drawing 13, the release carbon button 253 cuts some rails of the memory card section 260, lacks and is arranged. When a user looks into a finder, the rail section is cut and lacked in extent which does not spoil the function so that it may not be interfered. By this 4th example, since the electronic "still" camera itself has turned into the memory card of PCMCIA specification completely, a dimension L is set to 10.5mm. This 4th example camera does not have an unnecessary lug, and is excellent in portability.

[0070] Next, it explains to the 5th example using drawing 1515 and drawing 16 which show the structural modification which carried out the gestalt of Type III of PCMCIA specification, and indicate this 5th example similarly to be said drawing 8 and drawing 9. Moreover, a sectional view when the two-dot chain line shown by A-A in drawing of drawing 1515 cuts is shown in drawing 17. In addition, in drawing 17, in order to simplify illustration, the alternate long and short dash line in drawing shows the appearance range of the 5th example camera concerned.

[0071] In the case of this 5th example, unlike the 4th example etc., it is made as [become / the optical axis of these lens systems is bent 90 degrees by the above-mentioned 45 degree mirror 352 after the above-mentioned condensing/protection lens 311, and / the lens assembly in a lens / finder section 355 consists of condensing/protection lens 311, the 45 degree mirror 352, the pre-group lens 383 and diaphragm 312, and a back group lens 313, and / assembly / parallel to the longitudinal direction of the memory card section 360]. Image formation of the image light through the back group lens 313 of the lens assembly concerned is carried out on CCD image sensor 320, and the image pick-up signal from CCD image sensor 320 concerned is sent to the signal-processing system of a printed circuit board 371. Moreover, by this 5th example, the release carbon button 353 and the information-display section 352 are formed in ****, and a lens 311 and Finders 354a and 354b are also pressed down in the same field as a memory card appearance so that the maximum appearance of Type III may not be protruded. In addition, as a means to bend the optical axis after the above-mentioned condensing/protection lens 311, prism can also be used instead of the above-mentioned 45-degree mirror 352.

[0072] The description of this 5th example is making it the configuration which bent lens assembly optical system 90 degrees using the mirror 352 (or prism) 45 degrees, as shown in the sectional view of drawing 17. If it does in this way, since the allowances of die length will be born in the direction of an optical axis of a lens assembly, the value of the focal distance f of lens assembly optical system is enlarged, and what a focal distance f is made adjustable for (that is, a zoom function is given) becomes possible. With this method, since it is possible to memory-card-ize the appearance of an electronic "still" camera itself completely too, there is no unnecessary lug and it excels in portability. According to the 5th example concerned, it becomes it is needless to say and possible to insert the camera itself in the memory card slot for Type III by the side of a host as it is.

[0073]

[Effect of the Invention] Since various main electric equipment articles, such as digital video-signal means forming and a compression means, are unified and constituted with an image pick-up means and optical system in this invention to the slot applied part of the appearance with which the slot for IC memory cards of the predetermined specification of a host device can be equipped as mentioned above, the magnitude as the whole will become as near as the magnitude of IC memory card. moreover, in this invention, optical system is arranged, or it is bending ***** (ing) the optical system itself 90 degrees with a mirror or prism, and thickness is made thin, it is using pipper as a finder application further, and the components mark for finders are reduced so that an optical axis may become parallel [the slot applied part of the appearance according to IC memory card] to one side. Furthermore, according to this invention, modification of the compressibility of data compression processing is enabled and a setup to arbitration of the number of sheets of the photography image recorded on a data-logging means is attained. [0074] Therefore, as compared with the conventional electronic "still" camera, it is very lightweight [small/lightweight], carrying becomes easy, and, for this reason, still picture

photography can perform the digital electronic "still" camera of this invention very quickly and simple. Moreover, since the configuration is very simple, the digital electronic "still" camera of this invention can reduce manufacturing costs, such as the cost of materials and a conversion cost, and can offer an electronic "still" camera cheap in price also from this.

[0075] Moreover, by having the memory card gestalt standardized, for example by PCMCIA specification, there is very large versatility, it inserts in the slot for the memory cards of a host device the whole digital electronic "still" camera of this invention, and since operation can be carried out, a quick activity can be performed at the time of use by computing environment.

[0076] A user purchases the digital electronic "still" camera of this invention freely with feeling like the so-called disposable camera, and becomes possible [dealing with it easily] from these things.

[Translation done.]